Programmable Video & Audio Test Generators

VTG 400D
VTG 400DVI

Professional Audio and Video Test Reference

➤ 113 selectable output rates, including high resolution computer-video, HDTV, and NTSC/PAL video

➤ 34 video test patterns

➤ Seven audio test signals

➤ Support for SDI/HD-SDI or DVI output

➤ Patented Scope-Trigger™ expedites signal/system troubleshooting when using an oscilloscope

➤ Broadcast quality video encoder

➤ Programmable and upgradeable

➤ RS-232 control

Extron® Electronics

Introduction

The Extron **VTG 400D** and **VTG 400DVI** are advanced, programmable, and upgradable video and audio test generators that deliver accurate, full bandwidth video signal reproduction and high performance audio test signals. The VTG 400D and VTG 400DVI are professional quality reference tools for set-up, performance evaluation, calibration, and troubleshooting audio and video systems.

The VTG 400D and VTG 400DVI offer a comprehensive array of video test patterns, as well as a suite of audio reference signals. High resolution RGB computer-video is output simultaneously on BNC and 15-pin HD connectors. NTSC and PAL video is output simultaneously as RGB, component video, S-video, and composite video, while audio output is both balanced on XLR and unbalanced on 3.5 mm mini jack.

The VTG 400D includes SDI/HD-SDI output and unbalanced audio output on RCA. The VTG 400DVI includes DVI-D output as well as the ability to display the native resolution of a DVI device when new EDID data is received.

The VTG 400D and VTG 400DVI are designed for universal video display compatibility. A total of 113 output scan rates are available for high resolution computer-video, as well as HDTV, NTSC, and PAL. Up to 180 additional rates can be programmed into the test generators. Their audio test generators are fully compatible with professional and consumer audio equipment, and deliver accurate performance for microphone level inputs while being resistant to phantom power.

Operation of the VTG 400D and VTG 400DVI is intuitive and convenient, with an easy-to-read LCD screen on the main panel, direct access buttons, and memory presets for quick saving and recall of user settings. The test generators can be programmed and upgraded with new test patterns and custom scan rates through the RS-232 port using the included Extron control software.

A powerful and innovative feature is the Patented Scope-Trigger output, which enables analysis of a selected area within the video image using an oscilloscope. Scope-Trigger delivers quick and easy oscilloscope operation with minimal effort. Any desired location, or pixel, within a video image can be accurately targeted and then simultaneously examined on an oscilloscope via a precisely timed trigger signal from the test generator.

Housed in a rugged, lightweight metal enclosure, the VTG 400D and VTG 400DVI are ideal for both field and permanent A/V applications.
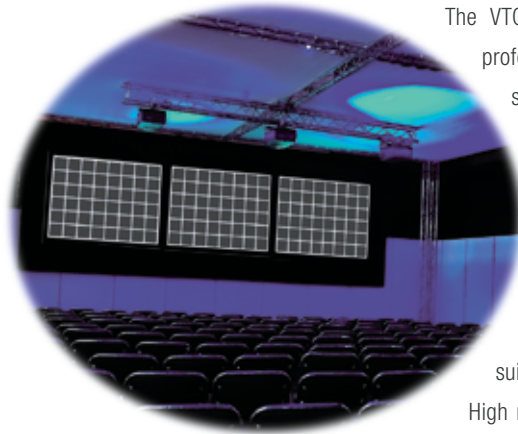
The VTG 400 is ideal for critical set-up and calibration of A/V systems.

The VTG 400 delivers professional quality audio and video test signals.

EDID Data Display
The VTG 400DVI will display the native resolution of a device for three seconds, each time it receives new EDID data.

Overview

Simultaneous RGB outputs
High resolution RGB video is simultaneously output on BNC and 15-pin HD connectors.

RS-232 serial port
An RS-232 serial port is provided for custom scan rate programming, firmware upgrades, and control.

DVI output
DVI output for compatibility with systems using DVI digital video

VTG 400DVI top

Multiple video outputs
Video test patterns are simultaneously output as RGB, component video, S-video, and composite video.

Scope-Trigger™ output
Outputs a dedicated trigger signal to an oscilloscope that is precisely timed to a user-defined location within the image.

Multiple audio outputs
Audio test signals are simultaneously output as balanced or unbalanced

SDI/HD-SDI
SDI/HD-SDI output for compatibility with systems using SDI or HD-SDI digital video

VTG 400D top

Navigation & selection
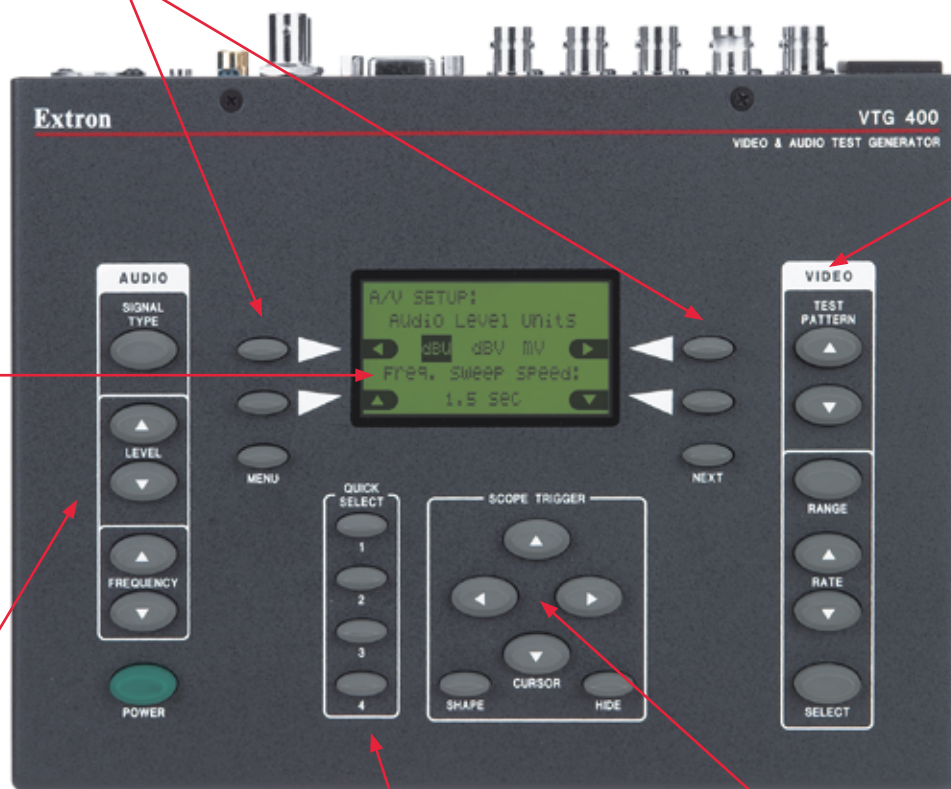These buttons provide intuitive menu navigation, as well as parameter or function selection.

Video test pattern selection
Dedicated buttons enable direct access to video test patterns, as well as selection of output scan rate.

LCD interface
The easy-to-read LCD display facilitates user-friendly operation.

VTG 400D Front

Audio test signal selection
Dedicated buttons enable direct access to audio test signals, as well as specification of output level and frequency.

Quick select
User settings, including output scan rates and test signal selections, can be saved to and recalled from memory presets via these buttons.

Scope-Trigger
This set of buttons provides direct access to Scope-Trigger adjustments, including navigation buttons to precisely define the Scope-Trigger location within the image.

Features

More than 100 output scan rates

The VTG 400D and VTG 400DVI provide 113 factory scan rates for high resolution computer-video, HDTV, and 16:9 high resolution, as well as standard definition NTSC and PAL video. The maximum output scan rate for computer-video is QXGA (2048x1536). To ensure compatibility with any new, current, or legacy display, the test generators accommodate up to 180 additional user-programmable scan rates.

Video test patterns

The VTG 400D and VTG 400DVI offer 34 video test patterns, including multiple crosshatch patterns, various color bars – SMPTE, EBU, and 8-color split, PLUGE, crop patterns, geometry, multiburst, grayscale, ramp, H patterns, bounce, a focus pattern, and a series of alternating pixel patterns. Several of these are exclusive to the VTG 400D and VTG 400DVI. Some patterns feature adjustable output levels ranging between 0 and 100%, or 0 and 100 IRE, in 1%, or 1 IRE steps. Select test patterns are reversible.

Audio test signals

These high performance, professional quality audio test generators deliver sine waves, square waves, pink noise, white noise, polarity, frequency sweeps, and sine wave bursts. The output level is adjustable and frequencies are selectable from 20 Hz up to 20 kHz in 1/12 octave increments. Additional adjustments are available for frequency sweeps and sine wave bursts.

Scope-Trigger output

Using the innovative Patented Extron Scope-Trigger output feature, a specific area within the test pattern image can be quickly and easily targeted for analysis using an oscilloscope. This feature is particularly beneficial in troubleshooting signal and display issues. US patent 7,394,474.

Quick Select memory presets

User settings, including output scan rates and test signal selections, can be saved to and recalled from four memory presets via direct access buttons on the main panel.

The VTG 400D with included soft nylon carrying case.

Broadcast quality video encoder

The VTG 400D and VTG 400DVI feature broadcast quality video encoders to ensure compliance with SMPTE and NTSC/PAL standards for accurate video performance.

Video outputs

Video test patterns are output as RGB on BNC and 15-pin HD connectors, component video and composite video on BNC connectors, and S-video on a 4-pin mini DIN connector.

HD-SDI or DVI digital video output

The VTG 400D provides SDI and HD-SDI output signals on a BNC connector. The VTG 400DVI includes DVI-D output on a female DVI-I connector as well as the ability to display the native resolution of a DVI device when new EDID data is received.

Audio outputs

Audio test signals are output as balanced or unbalanced audio on a 3-pin XLR connector, and unbalanced audio on a 3.5 mm mini stereo audio jack. The VTG 400D also outputs unbalanced audio on RCA

Auto sequence mode

Specific test patterns can be selected for a repeating sequence with selectable time intervals.

Selectable RGB color output

Each color channel – Red, Green, or Blue – can be enabled or disabled via the set-up menu.

Auto-memory recall

Settings are saved when the test generators are turned off and automatically recalled when subsequently powered.

Screen Saver mode

An adjustable timer can be set to engage the VTG 400D or VTG 400DVI in Screen Saver mode, with either the video output muted or as a repeating sequence of test patterns.

RS-232 serial control

The test generators can be updated for expanded capabilities such as new test patterns and custom scan rates using the RS-232 serial port and the included Extron control software. The units can be controlled by a third-party control system to provide advanced system integration and flexible control.

Control software

The Windows control software facilitates remote set-up, programming, and operation of the VTG 400D and VTG 400DVI. All functions from the main panel are duplicated, and the graphical interface expedites and enhances user interaction.

Rugged metal enclosure

The VTG 400D and VTG 400DVI feature a compact, rugged enclosure that is appropriate for field testing, but can also be placed on a desktop or mounted in a rack. For added protection and portability, a soft nylon carrying case is included.

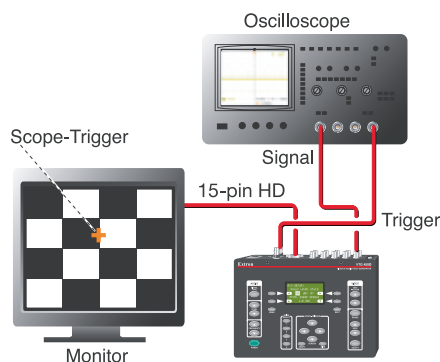# Scope-Trigger
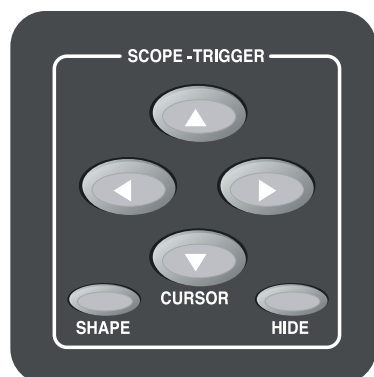
Scope-Trigger

Have you ever wanted to analyze a video signal on an oscilloscope, only to find yourself constantly fumbling with the scope controls in an attempt to achieve a useable, stable display? Have you ever been frustrated trying to pinpoint specific locations within a video signal that correlate with what you see on a display?

Extron's Patented Scope-Trigger is an innovative and powerful feature of the VTG 400D and VTG 400DVI that solves these problems, delivering quick and easy oscilloscope display with minimal effort. With simple, user-friendly controls, any desired location, or pixel, within a video image can be targeted and then simultaneously examined on an oscilloscope, via a precisely timed trigger signal from the VTG 400D or VTG 400DVI.

Video signal analysis using an oscilloscope and the VTG 400D or VTG 400DVI is accomplished in three easy steps:

Step 1: Set-up

Set up the system as illustrated below. A duplicate of one of the RGB video signals for the display is input to the oscilloscope. Be sure to connect the Scope-Trigger output of the VTG 400D or VTG 400DVI and the external trigger input of the oscilloscope. Also, be sure that you have selected the desired video test pattern.

Step 2: Position the cursor

Engage Scope-Trigger by pressing any of the dedicated buttons on the main panel. An orange crosshatch cursor appears on screen, which you can also change to a single pixel cursor. Using the directional buttons, position the cursor at any desired location, or pixel, on the screen. The cursor can also be positioned beyond the screen for analyzing video interval sync signals.
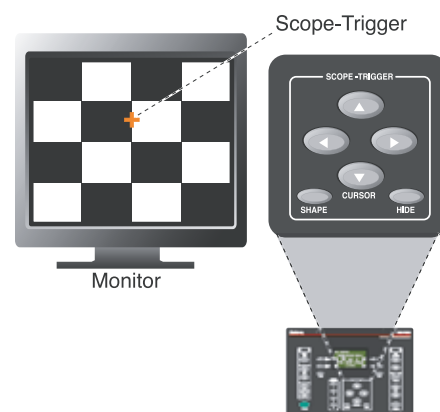

Step 3: Oscilloscope display

Now, look at the oscilloscope. The trace that is displayed is centered precisely at the location of the Scope-Trigger cursor. Using the Scope-Trigger feature, it is no longer necessary to count video lines or make numerous scope control adjustments.
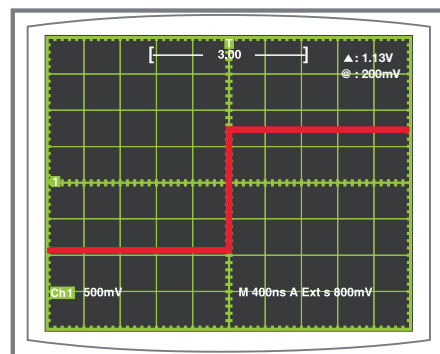
Video Test Patterns

The VTG 400D and VTG 400DVI video test generators include 34 test patterns for calibrating, testing, and troubleshooting any type of A/V system, including projectors and flat panel monitors, HDTVs, and legacy CRT projectors and direct view displays. Several of the patterns are reversible, and some are variable in video output level. The Extreme Grayscale, Contrast Transfer Function, Multipulse, and other patterns were exclusively created for the VTG 400D and VTG 400DVI. Additional test patterns may be added in the future as part of firmware updates via the Windows® control software.
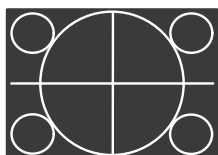
Circles
Using the circles as a guide, this pattern is used to evaluate and adjust the geometry of the display device. The center crosshatch aids in proper centering.
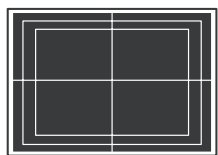
Safe Area - 5%/10%
This pattern is used to indicate the safe area of display and inner safe area for titling within NTSC and PAL applications. For graphics displays, this pattern serves as a guide for symmetrical alignment of borders and text.
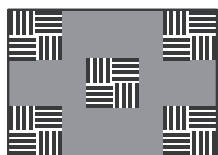
Focus Pattern
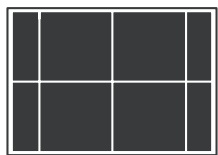This pattern can be used to check display focus and resolution.

16:9 Crop
When the border of this pattern is properly aligned at the edges of a 4:3 screen, the two horizontal lines define proper centering and shape of a superimposed 16:9 image.

4:3 Crop
When the border of this pattern is properly aligned at the edges of a 16:9 screen, the two vertical lines define proper centering and shape of a superimposed 4:3 image.

Rectangle/Square Crosshairs
This pattern can be used to properly center the image and set geometry. For CRT-based projectors, this pattern is used to check and adjust gross linearity and static convergence.
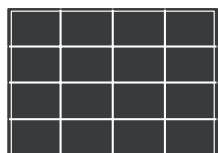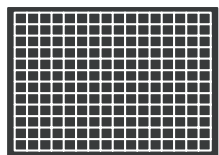
4x4 Crosshatch
This pattern can be used to set up a scaler or video processor for 2x or 4x zoom, or 1/4 or 1/16 downsizing. An application of this crosshatch is setting up videowall displays.
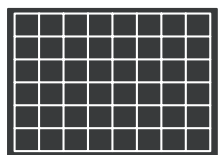
Coarse Crosshatch
This crosshatch pattern can be used to set projector focus and geometry. For CRT projectors, this crosshatch pattern is for examining and adjusting both static and dynamic convergence.

Fine Crosshatch
This pattern has twice the number of horizontal and vertical lines as the Large Crosshatch. It is useful for critical convergence adjustments with stacked projectors and evaluating optical qualities of projector lenses, such as chromatic aberration.

PLUGE
The vertical bars are used to set the black level, or brightness, while the horizontal bars aid in setting the contrast level for the display.
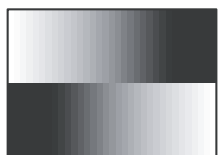
32-level Split Grayscale
With two opposing rows of 32 stepped bars of gray between the lowest and highest levels, this pattern is used for setting and assessing grayscale tracking, and evaluating contrast linearity on displays.
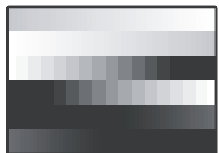
Extreme Grayscale
This pattern features shallow grayscale ramps that allow for evaluation of display performance with subtle or very small grayscale level gradations.

Ramp
This pattern is used to evaluate the performance of a display or video processor on the basis of its pixel bit depth capability. The pattern should appear to be smooth, with no contouring or stepping.

Color Bars - 8-Color Split
This pattern is used for testing all of the video color channels and setting video drive levels. It is also used to check low frequency crosstalk between the red, green, and blue color channels.

SMPTE Color Bars with PLUGE Pattern
For NTSC video equipment, the SMPTE color bars are used to set up tint and color, while the PLUGE video pattern is for adjusting brightness and contrast.

EBU Color Bars - 8-Color Full Bars
The EBU color bars are primarily used to set up color for PAL video equipment.

Video Test Patterns

80% Window
A window at 80% or 80 IRE video level, surrounded by black, is used in fine tuning the color balance, or grayscale, of a display with a color analyzer. The gain, or drive setting is fine tuned for each of the RGB color adjustments.

20% Window
A window at 20% or 20 IRE video level, surrounded by black, is used in fine tuning the color balance, or grayscale, of a display with a color analyzer. The bias, or offset setting is fine tuned for each of the RGB color adjustments.
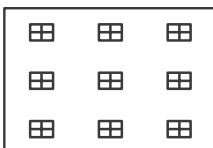
Window - Variable Level
The video level of the window can be adjusted between 0% or 0 IRE and 100% or 100 IRE in 1% or 1 IRE steps. This pattern is useful in fine tuning and evaluating grayscale performance of a display.

Flat Field
This pattern is used to evaluate white field uniformity. For RGB signals, each color channel can be selectively enabled to assess color uniformity. The video level is variable between 100% or 100 IRE and 0% or 0 IRE in 1% or 1 IRE steps.

Flat Field with Targets
This pattern is similar to Flat Field, but only at 100% video level and with targets added to support the ANSI measurement method for determining projector brightness.
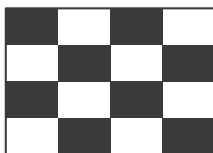
Checkerboard - Variable Level
This is the ANSI contrast ratio test pattern for measuring contrast ratio as well as adjusting and assessing display performance. This reversible pattern is variable in level between 100% or 100 IRE and 0% or 0 IRE in 1% or 1 IRE steps.
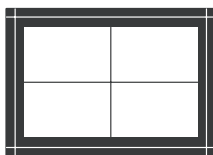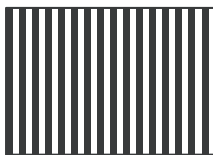
Bounce - Automatic
The center window alternates between 90% and 10% average picture level at 0.5 second intervals. This pattern is used for checking high voltage regulation on CRT displays, as well as black level stability.
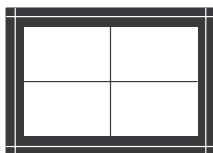
Bounce - Manual
This is similar to the automatic Bounce pattern, but allows the user to manually toggle between 90% and 10% average picture level.

Alternating Pixels
This one pixel "on," one pixel "off" pattern is used for assessing the performance of high resolution monitors and projectors, EMI testing for worst case radiation, and pixel clocking and pixel phasing adjustments on a digital display.
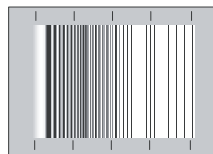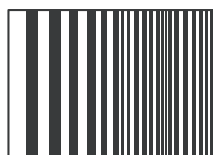
Frequency Sweep
These alternating "on" and "off" vertical bars are used to evaluate the frequency response of an NTSC or PAL video system.
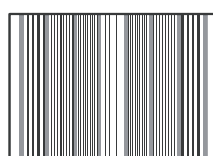
Graphics Multiburst
This pattern of grouped alternating bars at the highest "on" and lowest "off" video levels is used to test display resolution capability for computer-video and HDTV.

Multiburst
This pattern of grouped alternating bars at the highest "on" and lowest "off" video levels with increasing frequency is used to test bandwidth performance for NTSC and PAL video.
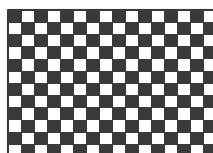
Alternating Pixels - 2-Dimensional
This offset, one pixel "on," one pixel "off" pattern is used for fine-tuning pixel clocking and pixel phasing adjustments for high resolution displays.
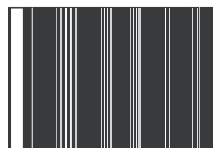
Multipulse
This pattern is used to measure the frequency response and group delay of the NTSC/PAL transmission channel.

Transient Response
The high and low level bars against the gray background are used for evaluation of transient response of the video signal.
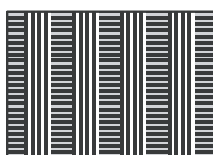
Contrast Transfer Function - CTF
This Patented pattern is for evaluation of total video system response. The VTG 400D and VTG 400DVI LCD display provides an indication of contrast transfer percentage when the user has matched the brightness of the horizontal lines to that of the vertical lines. US patent 7,369,159.

H Pattern
This pattern is used to check or evaluate video clamping stability, focus for projectors, and video pulse response, as well as to simulate text. The user can toggle between white-on-black and black-on-white.
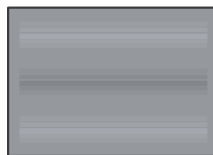
Hum Bar Test - Variable Level
This pattern is used to reveal the presence of any hum bars, which indicate interference attributable to the video signal or the equipment. The test pattern level is adjustable from 1% to 100%.

Output Rates

COMPUTER SCAN RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
VGA	640 x 480	31.5	60	RGB, DVI**
VESA2 (VGA)	640 x 480	37.9	72	RGB, DVI**
VESA1 (SVGA)	800 x 600	35.2	56	RGB, DVI**
VESA5 (SVGA)	800 x 600	37.9	60	RGB, DVI**
VESA6 (SVGA)	800 x 600	48.1	72	RGB, DVI**
VESA3 (XGA)	1024 x 768	48.4	60	RGB, DVI**
VESA4 (XGA)	1024 x 768	56.4	70	RGB, DVI**
XGA5	1024 x 768	57	70	RGB, DVI**
VESA8 (XGA)	1024 x 768	60	75	RGB, DVI**
VESA9 (XGA)	1024 x 768	68.7	85	RGB, DVI**
VESA10 (XGA+)	1152 x 864	67.5	75	RGB, DVI**
1280 x 960	1280 x 960	60	60	RGB, DVI**
1280 x 960	1280 x 960	70	70	RGB, DVI**
1280 x 960	1280 x 960	75	75	RGB, DVI**
VESA11 (SXGA)	1280 x 1024	64	60	RGB, DVI**
VESA12 (SXGA)	1280 x 1024	91.1	85	RGB, DVI**
SXGA+1	1400 x 1050	63.9	60	RGB, DVI**
SXGA+2	1400 x 1050	65.32	60	RGB, DVI**
VESA13(UXGA)	1600 x 1200	75	60	RGB
VESA14(UXGA)	1600 x 1200	87.5	70	RGB
VESA15(UXGA)	1600 x 1200	106.3	85	RGB
LCoS1	1360 x 1024	80	75.1	RGB, DVI**
LCoS2	1365 x 1024	65.2	60	RGB, DVI**
QXGA	2048 x 1536	99.46	60	RGB
QXGA	2048 x 1536	115	71.8	RGB

WORKSTATION RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
SGI	640 x 480	31.5	60	RGB, DVI**
SGI	640 x 512	32.22	60	RGB, DVI**
SGI	800 x 600	37.8	60	RGB, DVI**
SGI	960 x 680	42.84	60	RGB, DVI**
SGI	960 x 620	39.06	60	RGB, DVI**
SGI	1024 x 768	48.36	60	RGB, DVI**
SGI	1024 x 768	40.3	50	RGB, DVI**
SGI	1200 x 900	68.04	72	RGB, DVI**
SGI	1280 x 1024	53.25	50	RGB, DVI**
SGI	1280 x 1024	63.9	60	RGB, DVI**
SGI	1280 x 1024	76.68	72	RGB, DVI**
SGI	1500 x 1200	75.6	60	RGB, DVI**
SGI	1600 x 1024	63.38	60	RGB, DVI**
SGI	1600 x 1200	75	75	RGB, DVI**
SGI	1760 x 1100	71.04	60	RGB
SGI	1920 x 1035	33.75	60/30	RGB, DVI**
SGI	1920 x 1080	33.72	60/30	RGB, DVI**
SGI	1920 x 1080	70.31	60	RGB
SGI	1920 x 1080	84.37	72	RGB
SGI	1920 x 1200	77.52	60	RGB
SGI	1920 x 1200	85.27	66	RGB
SGI	2048 x 1120	83.45	72	RGB
SUN	1152 x 900	61.8	66	RGB, DVI**
SUN	1152 x 900	71.7	76	RGB, DVI**
SUN	1280 x 1024	81	76	RGB, DVI**
SUN	1600 x 1280	89.3	67	RGB
SUN	1920 x 1080	84.4	72	RGB
SUN	1920 x 1200	87.2	70	RGB
SUN	1920 x 1200	93.6	75	RGB

STEREO GRAPHICS RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
Stereo VGA	640 x 222	31.5	120	RGB, DVI**
SGI Stereo	640 x 480	60.84	120	RGB, DVI**
SGI Stereo	640 x 512	65.28	120	RGB, DVI**
SGI Stereo	1024 x 768	96.84	120	RGB, DVI**
SGI Stereo	1024 x 768	77.47	96	RGB, DVI**
SGI Stereo	1120 x 840	84.38	96	RGB, DVI**

STEREO GRAPHICS RATES (Cont.)

Rate Name	Resolution	H (kHz)	V (Hz)	Format
SGI Stereo	1280 x 1024	124.6	114	RGB
SGI Stereo	1280 x 1024	131.16	120	RGB
SGI Stereo	1280 x 492	63.96	120	RGB, DVI**

SUPER HIGH RES RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
Cornerstone	1600 x 1800	105	76	RGB
Extron	1280 x 1024	92	86.8	RGB, DVI**
Extron	1600 x 1280	95	70.9	RGB
Extron	1800 x 1440	105	70	RGB

16:9 HIGH RES RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
16:9 HR	848 x 480	31.02	60	RGB, DVI**
16:9 HR	852 x 480	31.8	60	RGB, DVI**
16:9 HR	960 x 540	33.78	60	RGB, DVI**
16:9 HR	1024 x 576	44.04	60	RGB, DVI**
16:9 HR	1024 x 576	52.85	72	RGB, DVI**
WXGA1	1280 x 768	45.11	56	RGB, DVI**
WXGA2	1280 x 768	48	60	RGB, DVI**
WXGA3	1280 x 768	47.7	60	RGB, DVI**
WXGA4	1280 x 800	49.7	60	RGB, DVI**
WXGA5	1360 x 765	47.7	60	RGB, DVI**
WXGA6	1365 x 768	47.27	60	RGB, DVI**
WXGA7	1360 x 768	47.7	60	RGB, DVI**
WXGA8	1366 x 768	47.8	60	RGB, DVI**
WSXGA	1440 x 900	55.94	60	RGB, DVI**
WSXGA + 1	1680 x 1050	64.67	60	RGB, DVI**
WSXGA + 2	1680 x 1050	65.29	60	RGB, DVI**
1080p PC	1920 x 1080	67.2	60	RGB
WUXGA1	1920x1200	74.52	60	RGB, DVI**
WUXGA2	1920 x 1200	74.6	60	RGB
WQXGA	2560 x 1600	99.46	60	RGB

HDTV RATES

Rate Name	Resolution	H (kHz)	V (Hz)	Format
480p	720 x 483	31.47	59.94	Y, R-Y, B-Y, RGB, DVI**
576p	720 x 576	31.25	50	Y, R-Y, B-Y, RGB, DVI**
720P	1280 x 720	18.75	25	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
720P	1280 x 720	22.48	30	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
720P	1280 x 720	22.5	29.97	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
720p	1280 x 720	37.5	50	Y, R-Y, B-Y, RGB, HDSDI, DVI**
720p	1280 x 720	45	60	Y, R-Y, B-Y, RGB, HDSDI, DVI**
720p	1280 x 720	44.96	59.94	Y, R-Y, B-Y, RGB, HDSDI, DVI**
1080i	1920 x 1080	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI, DVI**
1080i	1920 x 1080	33.75	30	Y, R-Y, B-Y, RGB, HDSDI, DVI**
1080i	1920 x 1080	28.13	25	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p	1920 x 1080	67.5	60	Y, R-Y, B-Y, RGB, DVI**
1080p	1920 x 1080	33.75	30	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p	1920 x 1080	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p	1920 x 1080	56.25	50	Y, R-Y, B-Y, RGB, DVI**
1080p	1920 x 1080	28.13	25	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p	1920 x 1080	27	24	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p (sf)	1920 x 1080	27	24	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1080p (sf)	1920 x 1080	26.97	23.98	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1035i	1920 x 1035	33.75	30	Y, R-Y, B-Y, RGB, HDSDI*, DVI**
1035i	1920 x 1035	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI*, DVI**

VIDEO RATES

| Rate Name	Resolution	H (kHz)	V (Hz)	Format
NTSC	720 x 480	15.7	60/30	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
NTSC 0 IRE (JPN)	720 x 480	15.7	60/30	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL – I	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL – B G H	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL – N	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*

* Requires VTG 400D
** Requires VTG 400DVI

Set-up, Programming, and Operation

Included with the VTG 400D and VTG 400DVI is a convenient, user-friendly Microsoft Windows-compatible software application that enhances and expedites set-up, programming, and operation. All functions and features of the VTG 400D and VTG 400DVI are easily accessible, including video and audio test signal selection, programming custom scan rates, Quick Select memory presets, and Scope-Trigger. This software is also essential for implementing firmware upgrades. User settings for the software can be saved to a file.
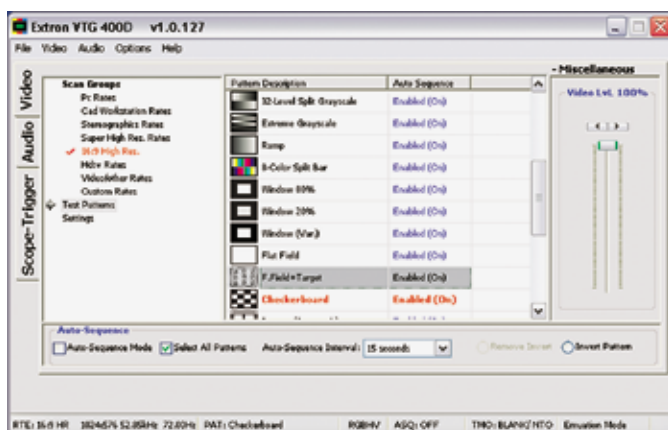
Video Setup Application
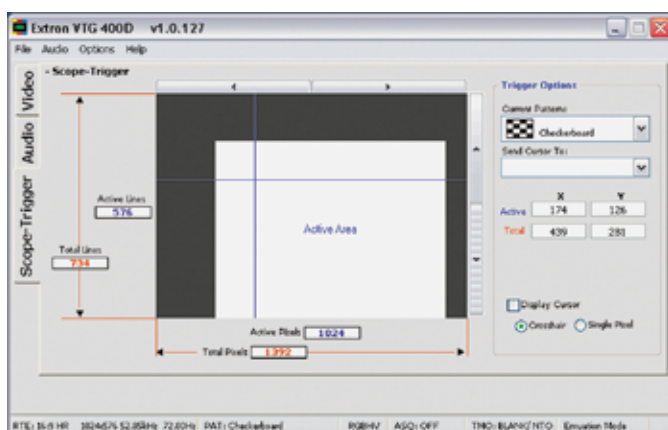
Scope-Trigger Application
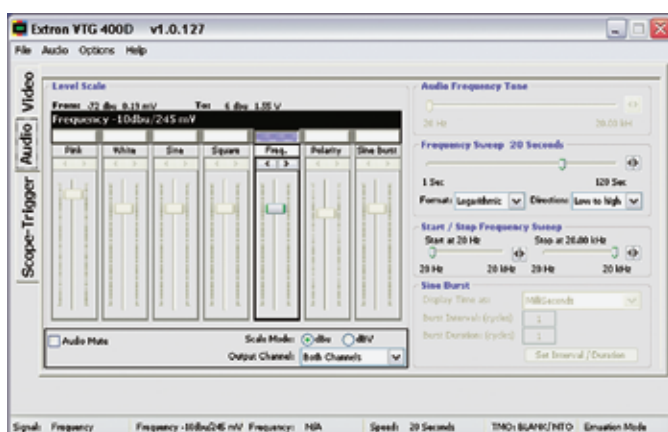
Audio Setup Application

Video

Scan rates are activated by simply viewing a list of available rates, and then double clicking with a mouse. The user can obtain comprehensive data relevant to any rate, including horizontal and vertical frequencies, active picture resolution, total picture resolution, horizontal and vertical sync pulse width, and much more. Up to 180 additional custom scan rates can be created by entering new data into the software, copying and then editing existing rates, or importing from a file. Any rate can be exported to a file.

Any test pattern is activated by selecting from a list with icons depicting the patterns. Depending on the test pattern, the video level is adjustable, and the pattern reversible. Other software controls duplicate the VTG 400D and VTG 400DVI main panel functions, such as selective RGB color channel output and the Auto Sequence and Screen Saver modes.

Scope-Trigger

The software takes Scope-Trigger functionality to a new level of ease and convenience. All of the user controls from the VTG 400D and VTG 400DVI main panel are duplicated, but the software adds the convenience of positioning the Scope-Trigger cursor anywhere within the video image by pointing and clicking. By clicking outside of the active or visible video area, portions of the signal, such as a vertical sync interval, can be examined on the oscilloscope.

Audio

Any of the seven available audio test signals are selectable with just the click of a mouse. Output levels for each signal are independently adjustable and simultaneously displayed. The appropriate custom parameters are automatically highlighted for the active signal. Output level units are displayed in dBu or dBV, as well as mV and V. All other audio functions, including muting and selective channel output, are easily within access.
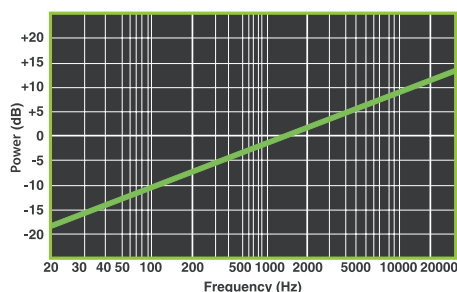
Audio Test Signals

The VTG 400D and VTG 400DVI feature comprehensive and intuitive professional-grade audio test generators. Seven reference test signals are available that are fully programmable, including frequency, amplitude - output level, and additional parameters. Ideal for use with testing, calibrating, and commissioning high performance audio products and systems, the VTG 400D and VTG 400DVI deliver less than 0.008% THD + noise at +6 dBu for a clean, crisp audio signal reference with no interference from the internal power supply and video test generator. The VTG 400D and VTG 400DVI also deliver frequency response from 20 Hz to 20 kHz, and output test signals between -72 dBu and +6 dBu, for full compatibility with professional and consumer audio equipment, and accurate signal generation at microphone level.

Audio Levels

Signal Format	Range (dBu)	Range (dBV)	Range (mV)
Pink Noise	-72 dBu to -4 dBu	-74 dBV to -6 dBV	0.20 mV to 500 mV
Polarity Test	-72 dBu to -14 dBu	-74 dBV to -16 dBV	0.20 mV to 158 mV
All other signal types	-72 dBu to +6 dBu	-74 dBV to +4 dBV	0.20 mV to 1.6 V

Audio level units are specified in dBu and dBV, as well as mV. For all test signals, the level is adjustable in 1 dBu or 1 dBV increments. The VTG 400D and VTG 400DVI output balanced audio on an XLR connector, and unbalanced audio on 3.5 mm mini jack. The VTG 400D also outputs unbalanced audio on RCA. The audio is delivered as mono to either or both of the left and right channels. User-friendly menus and dedicated audio buttons facilitate quick set-up and access to test signals and their parameters.


White Noise
- White noise is a randomly generated audio signal – or noise – with equal energy at every frequency.
- This test signal spans between 20 Hz and 20 kHz. The output level is variable from -72 dBu to +6 dBu, -74 dBV to +4 dBV.
- White noise is used in audio level measurement and equipment calibration.
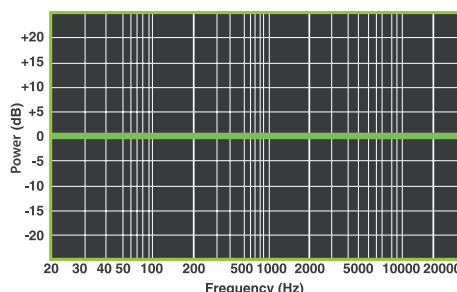

Pink Noise
- Pink noise is a variant of white noise with equal energy at every octave. It is the result of passing white noise through a 3 dB per octave low pass filter.
- This test signal spans between 20 Hz and 20 kHz. The output level is variable from -72 dBu to -4 dBu, -74 dBV to -6 dBV.
- Pink noise is used in testing and calibrating loudspeakers and sound systems, as well as analyzing and equalizing the acoustical characteristics of room environments.
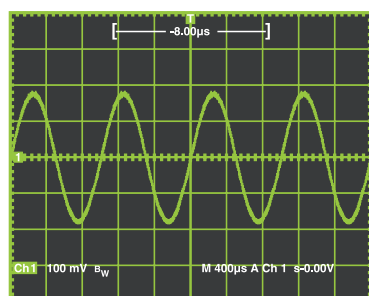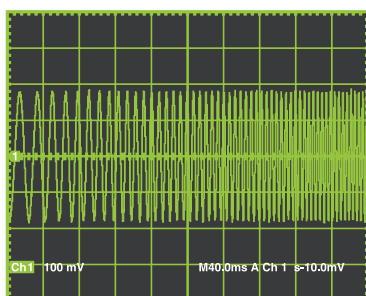

Sine Wave
- Sine waves are periodic, oscillating waveforms represented as sine curves and are elementary components of sound.
- The VTG 400D and VTG 400DVI generate sine waves with programmable amplitude between -72 dBu and +6 dBu, -74 dBV and +4 dBV, and frequency specified between 20 Hz and 20 kHz in 1/12 octave steps.
- Sine wave signals are used in testing and measuring the frequency response and distortion of audio products, as well as crosstalk between the left and right channels.

Audio Test Signals
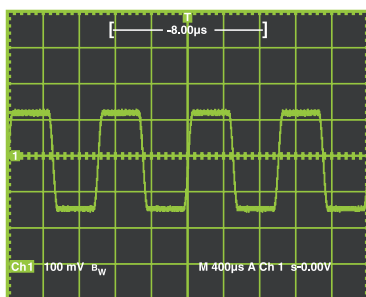
Square Wave

- Square waves are waveforms with a 50% duty cycle and no DC offset, and are characterized as rectangular-shaped waveforms.
- The frequency can be generated from 20 Hz to 5 kHz in 1/12 octave steps. The output level is variable from -72 dBu to +6 dBu, -74 dBV to +4 dBV. Because square waves can damage equipment if played at high levels, the VTG 400D and VTG 400DVI can be set to automatically attenuate the output level to -40 dBu whenever square wave output is selected.
- Square waves are usually for testing DC response stability in audio electronics.


Swept Sine Wave

- A swept sine wave test signal is a continuous sine wave frequency progression that sweeps between two values.
- The VTG 400D and VTG 400DVI offer considerable flexibility in programming swept sine waves. The starting and ending frequencies can be any value between 20 Hz and 20 kHz in 1/12 octave steps. The sweep can progress from the lower to the higher frequency value, or vice versa, with a logarithmic or linear progression. Furthermore, the duration of the sweep is selectable among 15 time intervals between 1 and 120 seconds. The output level is adjustable from -72 dBu to +6 dBu, -74 dBV to +4 dBV.
- Swept sine waves are used when testing loudspeaker and crossover defects as well as mechanical vibration sources in the room. They are also effective in measuring and testing room acoustics.
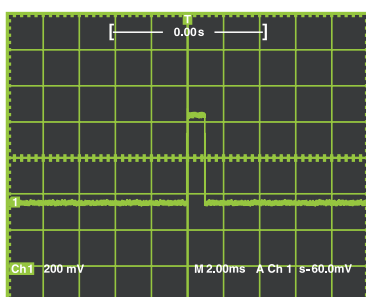
Polarity Test

- A polarity test signal is a positive phased pulse with duration of 1 ms and 0.1% duty cycle and 1 s intervals between pulses.
- The output level is limited between -72 dBu and -14 dBu, -74 dBV and -16 dBV.
- The polarity test signal is useful in determining proper polarity in wiring connections for audio electronics and loudspeakers.
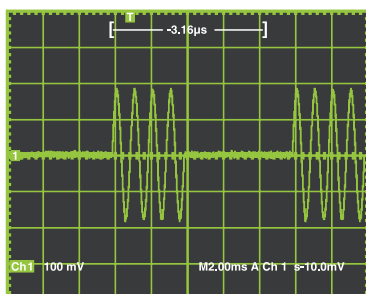
Sine Wave Burst

- The Sine Wave Burst generates a sine wave of a specified frequency that is gated on and off for fixed intervals.
- The VTG 400D and VTG 400DVI allow for adjustment of the burst interval – the total number of cycles in each repeating period, and the burst on duration – the number of cycles in the interval when the sine wave is turned on. The output level is adjustable from -72 dBu to +6 dBu, -74 dBV to +4 dBV.
- Sine wave bursts are used in testing the transient response of audio systems.

Specifications

VIDEO SIGNAL CHARACTERISTICS

Dot clock	200 MHz (max.)
Pixel clock accuracy	100 ppm
Horizontal frequency range (factory defaults)	15 kHz to 131 kHz
Vertical frequency range (factory defaults)	30 Hz to 120 Hz
Rise/fall time	
NTSC, PAL	140 ns
All other signal rates	<4 ns

VIDEO OUTPUT

Number/signal type	2 RGBHV, RGBS, RGsB, RsGsBs
	1 component video
	1 S-video
	1 composite video (NTSC/PAL)
	1 HD-SDI (SMPTE 292M), SDI (SMPTE 259M-C) – VTG 400D only
	1 DVI-D (single link) – VTG 400DVI only
Connectors	1 x 5 female BNC (RGB)
	1 female 15-pin HD (RGB)
	1 x 3 female BNC (component video)
	1 female 4-pin mini DIN (S-video)
	1 female BNC (composite video)
	1 female BNC (SDI/HD-SDI) – VTG 400D only
	1 female DVI-I (DVI-D) – VTG 400DVI only
Nominal level	1 Vp-p for RsGsBs, Y of component video and S-video, and for composite video
	0.7 Vp-p for RGB and for R-Y and B-Y of component video
	0.286 Vp-p (burst) for C of NTSC S-video, 0.300 Vp-p (burst) for C of PAL S-video
Minimum/maximum levels	0.0 V to 1.0 Vp-p
Impedance	75 ohms
Resolutions	Computer (VGAQ, XGA), video (NTSC, PAL), HDTV, 16:9 high resolutions, and custom resolutions (user-defined)
Return loss	-30 dB @ 5 MHz
DC offset	0 ±5 mV for RGB and component video,
	0 ±5 mV for NTSC S-video and composite video
	14 mV ±5 mV for PAL S-video and composite video

SYNC

Output type	RGBHV, RGBS, RGsB, RsGsBs (for RGB signals)
	Tri-level on Y, R-Y, B-Y channels (component video 720p, 1080i, 1080p)
	Bi-level on Y channel (for all other component video rates)
Standards	NTSC, PAL, SMPTE 170M, SMPTE 274M, SMPTE 293M, SMPTE 295M, SMPTE 296M
Output level	0.3 Vp-p for RGsB, RsGsBs, component video (bi-level sync)
	0.6 Vp-p for RsGsBs, component video (tri-level sync)
	TTL: 5.0 Vp-p, unterminated for RGBHV, RGBS
Output impedance	75 ohms
Max. rise/fall time	5 ns (TTL sync)
Polarity	Positive or negative (scan rate/signal dependent)
Scope trigger connectors	1 BNC female (scope trigger)

AUDIO

THD + Noise	<0.008% typical @ +6 dBu (1.55 V), 1 kHz
	0.18% @ -38 dBu (9.75 mV), 20 Hz to 20 kHz
Flatness	±0.05 dB @ 20 Hz to 20 kHz
Accuracy	±0.4 dB

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV≈ 2 dBu

AUDIO OUTPUT

Number/signal type	
VTG 400D	1 mono, balanced; 2 mono, unbalanced
VTG 400DVI	1 mono, balanced; 1 mono, unbalanced
Connectors	
VTG 400D	(1) 3.5 mm mini stereo jack (unbalanced mono left and right, tip-ring-sleeve)
	1 female RCA jack (unbalanced, tip-ring)
	1 male 3-pin XLR (balanced) (pin 1 = GND, pin 2 = +, pin 3 = -)
VTG 400DVI	(1) 3.5 mm mini stereo jack (unbalanced mono left and right, tip-ring-sleeve)
	1 male 3-pin XLR (balanced) (pin 1 = GND, pin 2 = +, pin 3 = -)

NOTE: The XLR output is immune to phantom power.

Impedance	50 ohms unbalanced, 100 ohms balanced
Waveforms	Pink noise, white noise, sine wave (fixed/swept burst), square wave, polarity test
Level ranges	Pink noise: -72 dBu to -4 dBu (-74 dBV to -6 dBV) (0.20 mV to 500 mVrms)
	Polarity test: -72 dBu to -14 dBu (-74 dBV to -16 dBV) (0.20 mV to 158 mVrms)
	All other signal types: -72 dBu to +6 dBu (-74 dBV to +4 dBV) (0.20 mVrms to 1.58 Vrms)
Maximum level (Hi-Z)	>+6 dBu, balanced or unbalanced at 1% THD+N
Maximum level (600 ohm)	>+4.66 dBu, balanced or unbalanced at 1% THD+N
Crest factor (pink noise)	3.25 (10.24 dB)
Crest factor (white noise)	1.98 (5.95 dB)
Rise time (square wave)	1.5 ms at 20 Hz to 7 µs at 5 kHz
Rise time (polarity test)	5 µs
Frequency accuracy (sine wave)	50 ppm

CONTROL/REMOTE — TEST GENERATOR

Serial control port	RS-232, 9-pin female D connector
Program control	Extron's control/configuration program for Windows®
	Extron's Simple Instruction Set (SIS™)

GENERAL

Power	100 VAC to 240 VAC, 50/60 Hz, 15 watts, internal
Enclosure type	Metal
Enclosure dimensions	6.75" H x 9.0" W x 1.75" D
	17.1 cm H x 22.9 cm W x 4.4 cm D
	(7.5" [19.1 cm] H including connectors.)
Product weight	3.3 lbs (1.5 kg)
Shipping weight	7 lbs (4 kg)
Regulatory compliance	
Safety	CE, CUL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±5%.

Model	Version Description	Part number
VTG 400D	Test Generator with SDI/HD-SDI Output	60-564-02
VTG 400DVI	Test Generator with DVI Output	60-564-03

Specifications are subject to change without notice.